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PHOTOGRAPHY,

ON GLASS AND PAPER,

REPRINTED FROM THE

“Collodion & Positive Paper Process,”

BY J. B. HOCKIN,

Operative Chemist,

With the permission of the Author, and the addition by him of

THE NEGATIVE PAPER PROCESSES, &c.

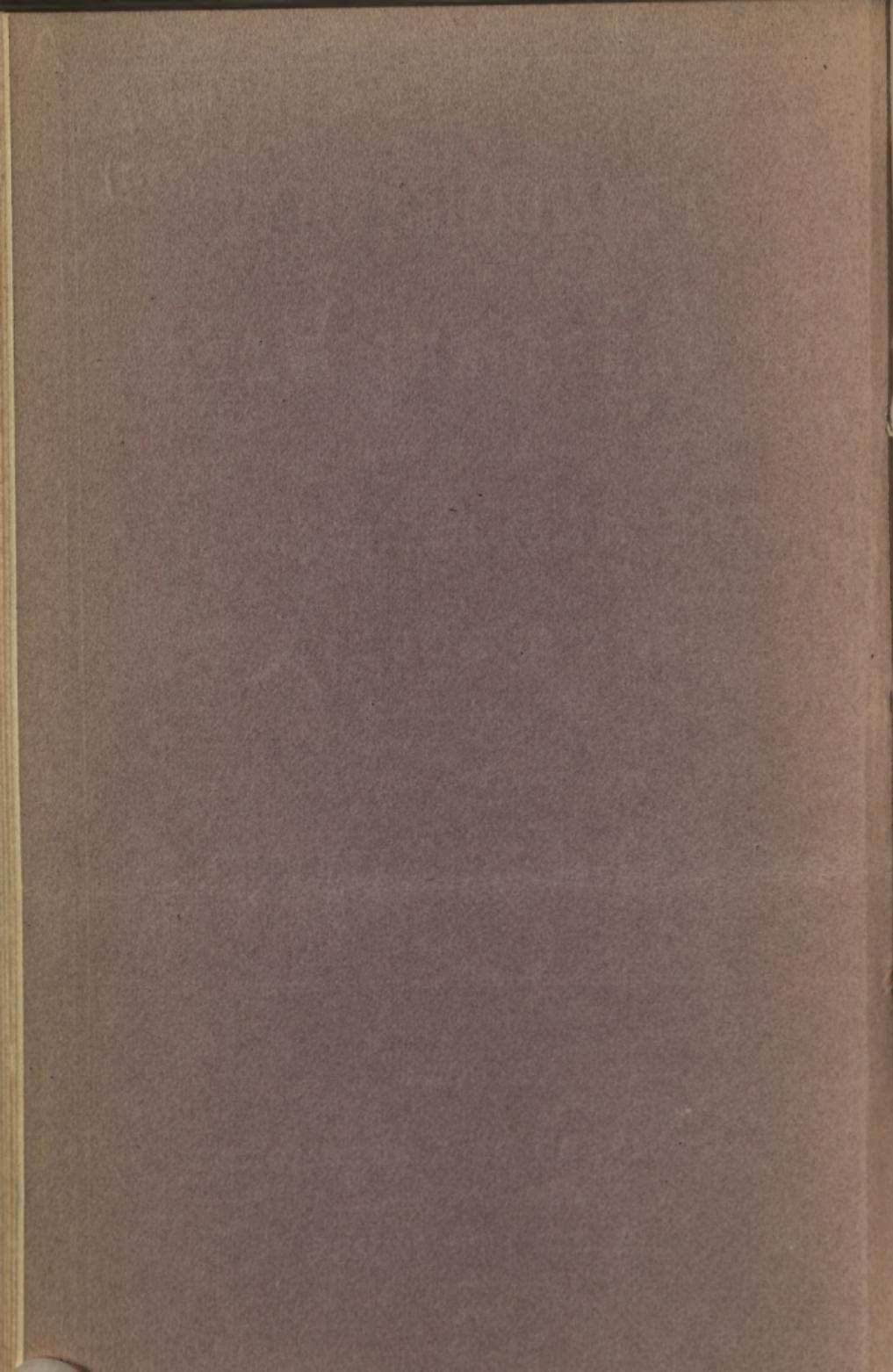
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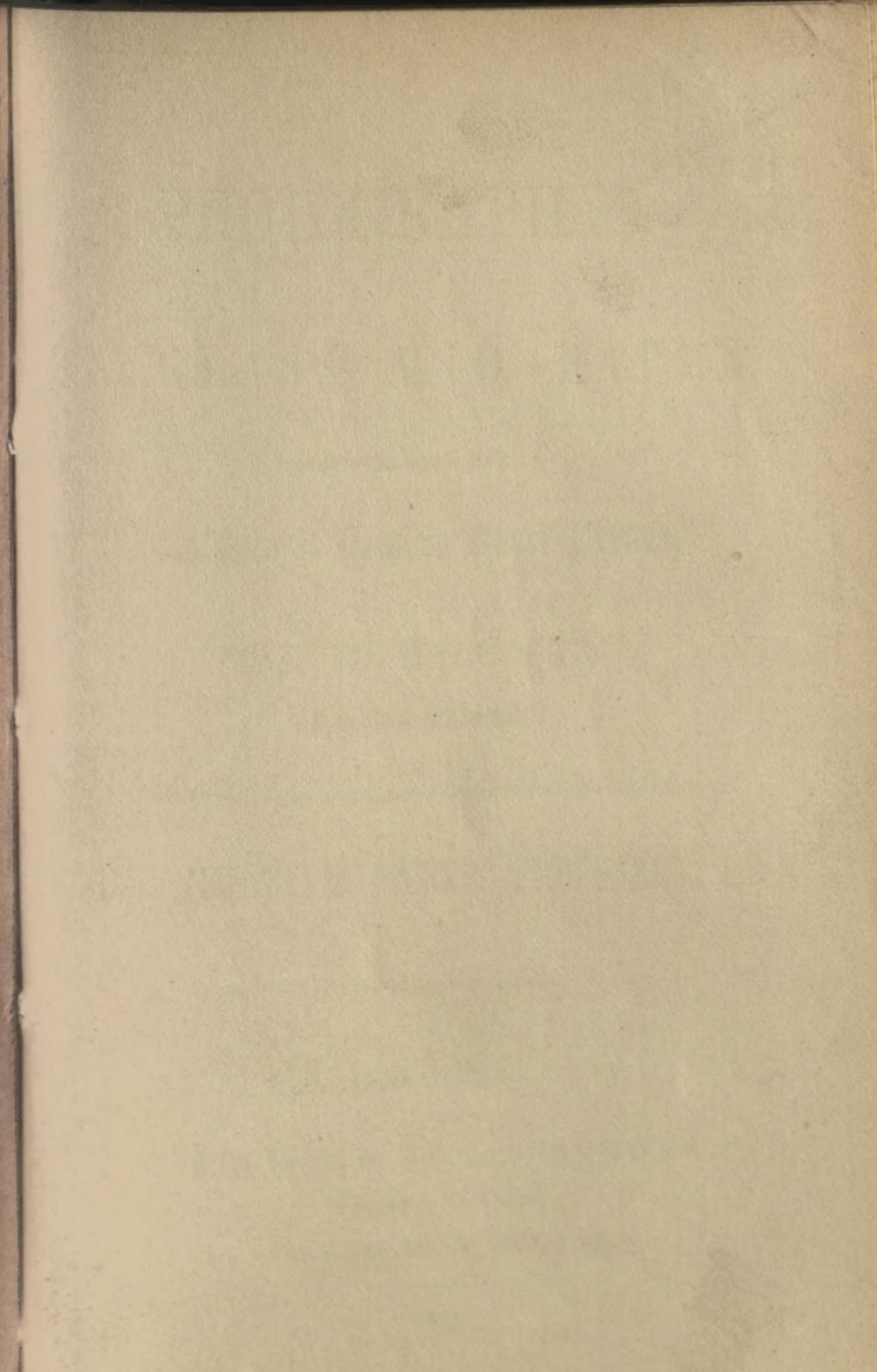
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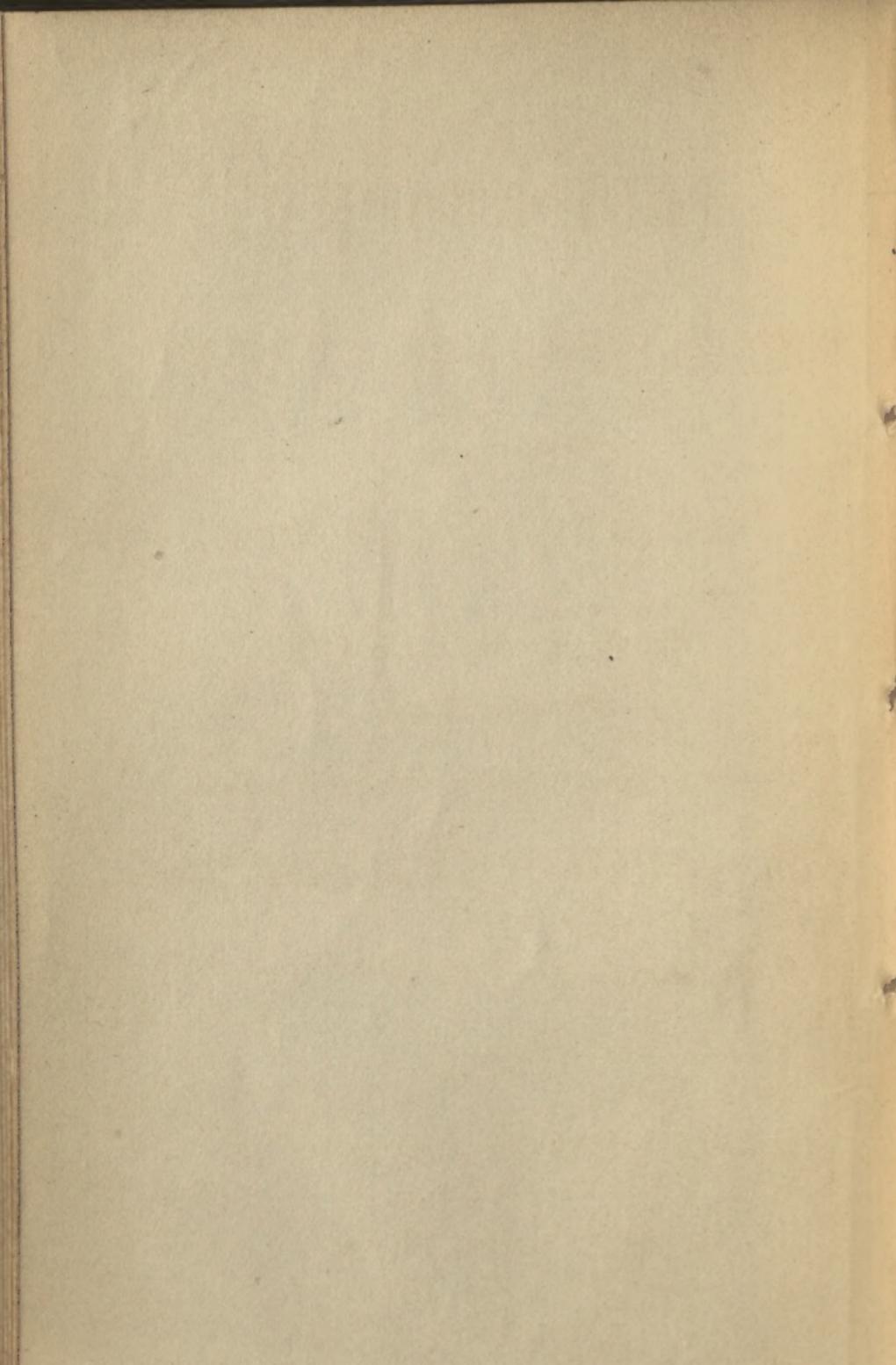
Wholesale Optician,

22, RED LION SQUARE.

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СИЯЯ ВОДЫ

ЛЯЧАТ СИА ВОДЫ

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Photographic Process
UPON
COLLODIONIZED GLASS.

CHAPTER I.

APPARATUS.

THE instruments required in the Collodion process are not numerous, nor are they necessarily expensive. The most important is the

CAMERA, a box blackened internally, and composed of two compartments, sliding the one within the other. The larger portion, or front, has fitted to the centre of its anterior extremity, the

LENS which should be *Achromatic*, *i. e.* composed either of *two glasses* of different refractive power, forming a *single combination*, usually mounted in a brass tube, either simply sliding within another tube, or adjusted by means of a *rack and pinion* or of *four glasses* forming a *double combination*. The former is most appropriate to Landscapes, the latter to Portraiture. The second portion of the Camera has at its posterior extremity grooves to which are adjusted the dark slides and the frame which carries the ground glass for focussing, *i. e.* a surface whereon the image projected by the lens is visible.

A TRIPOD STAND to support the Camera at the medium height of the eye.

A VERTICAL TROUGH and dipper composed of glass or gutta percha for immersing the glass plates, which are best cut from what is known as No. 1 patent plate, Two one ounce graduated measures, a minim measure, two funnels, some filtering paper, and three cloths, (one of which may be replaced by an old silk handkerchief, or a piece of wash-leather, freed by rinsing from the chemicals used in its preparation,) complete the list of apparatus absolutely required for the Collodion process.

In the Catalogue will be found many small pieces of apparatus which serve to facilitate manipulation.

CHAPTER II.

The chemicals required are few in number, but being exceedingly delicate, their preparation will be best left unattempted by beginners; more especially as they are now obtainable in a high state of purity and at a sufficiently moderate price from the Operative Chemist. They consist of

IODIZED COLLODION, a liquid made from a chemical allied to gun cotton dissolved in alcoholized æther, in conjunction with certain alcaline iodides. This material is very volatile, and must therefore be preserved in a bottle with a well ground glass stopper, (a cork would entirely spoil it,) kept in a cool situation at a distance from the fire or a lighted candle; inattention to the latter observation has caused many accidents.

In choosing this material, that should be preferred which remains colorless many days after being iodized.

THE SENSITIZING AGENT, nitrate of silver in crystals, not the ordinary fused in sticks, which is nearly always confessedly adulterated; it is thus employed:—

THE SILVER { Nitrate of Silver 5 drachms,
OR { Distilled water 10 ounces,
NITRATE BATH. { Dissolve and add iodized collodion 2 drachms.

Shake these well together, allow them to macerate twelve hours, and filter through paper. Test the liquid by immersing a piece of blue litmus paper, if it remain blue after being immersed *half a minute*, add *five drops* of dilute Nitric Acid,* and test again *for a minute*, and so on, until a claret red is indicated on the paper. It is necessary to test the bath in a similar manner frequently, adding five drops of dilute acid when required. This precaution will prevent the *fogging* due to alkalinity of the bath so formidable an obstacle to young hands.

The picture is *latent* on the plate being taken from the camera, it requires to be rendered visible by pouring on the plate one of the following

DEVELOPING AGENTS.

PYROGALLIC { Pyrogallic acid 3 grains,
SOLUTION. { Glacial acetic acid 1 drachm,
 { Soft water 5 ounces,
 { Formic acid 1 drachm, much improves this

The addition of
formula.

OR,
PROTO-NITRAT { Proto-sulphate of iron 140 grains,
OF IRON. { Distilled water 2 oz.,—dissolve,
 { Nitrate Potash pure 102 grains,
 { Distilled water 2 oz.,—dissolve

Mix the solutions, and add:

Glacial acetic acid 2 drachms.

* Dilute Nitric Acid, Water 100 parts, Nitric Acid 1 part.

OR,
 PROTO-SULPHATE
 OF IRON. $\left\{ \begin{array}{l} \text{Proto-sulphate of iron 10 grains,} \\ \text{Distilled water 1 ounce,} \\ \text{Glacial acetic acid 20 minims,} \\ \text{Dilute nitric 5 minims.} \end{array} \right.$

All these solutions, except the silver bath, should be made in small quantities at a time, as they do not keep well. The silver bath requires replenishing with a drachm of nitrate, dissolved in 1 ounce of water from time to time, (say after taking with it fifty pictures four inches by three.) It must necessarily become invalidated by long continued use, but as yet, I have never met with an instance.

FIXING MATERIALS.

HYP^O'
 SOLUTION. $\left\{ \begin{array}{l} \text{Hyposulphite of soda 2 ounces,} \\ \text{Soft water 5 ounces,} \end{array} \right.$

OR, $\left\{ \begin{array}{l} \text{Cyanide of potassium 5 grains,} \\ \text{Soft water 1 ounce.} \end{array} \right.$

The hypo' should be carefully kept at a distance from the other chemicals, the slightest trace of it in them would infallibly spoil them. If the hands, after using it, be wiped on one of the *three cloths*, or if they only touch them, it will be perceived upon the picture in the form of *dirty "smears"* between the glass and the film.

The cyanide is also useful for removing the silver stains from the hands or linen ; the only care necessary in using it being not to employ it except on the hands, where the skin is hard, and avoid its entering a cut or wound.

It is infinitely preferable to the Hypo' solution, it does its work more quickly, and is more easily removed during the final washing of the plate.

CHAPTER III.

THE DARK ROOM.

It is indispensable in the photographic process to have a room from which white light can be altogether excluded ; but in-as-much as all require the eyes to be used, we must illuminate with yellow light, which, if sufficiently dense, does not act upon the sensitive preparations : that which finds its way through sheet India rubber 1-32 inch thick, or three folds of yellow calico answers admirably. This room should, if possible, be provided with a supply of water and a sink ; nevertheless, if these be not attainable, a jug and basin will supply their places up to a certain stage, when a good stream of water is necessary.

THE OPERATING ROOM.

The conditions as to light, &c., necessary for taking a good portrait, are seldom found in a room unless built expressly, as will be perceived from the following observations ; therefore, the amateur should commence in the open air.

The sitter should be so placed as to be sheltered from the direct solar rays, but yet have the full benefit of all the diffused light, and that reflected from light-coloured surrounding objects. It tends to harmony in the picture if one side of the figure be *slightly* shaded.

The dark shades projected by the prominent features may be avoided by spreading near the feet some white material.

The most pleasing results are obtained when the

sun is slightly obscured, and there are many white clouds ; also, when the luminary is a few degrees from the horizon, and his rays are reflected to us from masses of white clouds, the actinic effect is very marked and rapid.*

The same conditions of light are equally favourable to Landscape, a somewhat clouded day being the most desirable ; if it be required to obtain the effect produced by sunshine, it is best to operate nine-tenths the exposure when the sun is clouded, and expose only one-tenth when he shines. But it must be remembered that no picture can succeed where the sun fronts the operator and shines into the lens ; his rays, then reflected in all directions from the interior walls of the camera, infallibly spoil every proof.

The double lens being quicker in its operation is best adapted for portraiture, the single for landscape. In the latter particularly, the various vertical planes being usually remote from each other, it is necessary to adapt in front of the lens discs of metal called *diaphragms*, pierced in the centre with holes varying in size with the distance between the planes of the foreground and extreme back. This observation applies also to the double combination. When an exaggerated attitude, such as a fencing position, is desired, the diaphragms must be used. But it should be remembered that the time of exposure must be lengthened considerably, perhaps in a proportion equal to the difference between the areas of the full aperture and that of the diaphragm.

* Actinism is the term applied to that portion of light which affects the photographic chemicals.

If a glass room be obtainable, it should be chosen with preference with a northern aspect, and be provided with calico blinds over head and around to shut out any excess of light. The management of light is one of the most difficult points in portraiture. A moveable back ground of blanket, or any *light* yellow material, should be placed behind the sitter.

Before we leave the subject, it will be proper to remark that colours make a very different impression upon the photographic plate to that upon the *eye*. Thus *blues* are all more or less *white*. *Reds* and *yellows* nearly black.* Now, as all other colours are but compounds of these, it follows that actinic light is to a great extent invisible to the eye, the blue ray being situate at the extreme limit of the *visible* Spectrum.

CHAPTER IV.

CLEANING THE PLATE.

First clean the plate by pouring over it a small quantity of Cyanide of Potassium solution; rinse it in an abundance of water, wipe with one cloth, dry it perfectly with another, and finish off by polishing with the handkerchief or leather appropriated solely thereto. The Cyanide replaces with advantage both Nitric Acid and Ammonia, the fumes of both which are noxious in the operating room; indeed, a very small proportion is sufficient to "fog" any number of pictures.

* This is a general rule, under the influence of a luminous ray at a certain angle of incidence, the photographic effect approximates much more nearly the optical.

COATING THE PLATE.

Hold the glass plate by one of its corners between the thumb and finger of the left hand, remove the stopper from the Collodion bottle by the little finger of the same hand, and cleanse the mouth from any dry material, (which falling on the plate would occasion spots, technically "comets":) then pour on to the centre as much Collodion as it will hold, and cause it to flow successively to each corner, avoiding the thumb; pour finally off at the corner nearest the body into the bottle, keeping up an oscillatory movement until it ceases to drip. Replace the stopper, keep the glass in the same position, and as soon as the thick edge appears set, place on the *dipper*, and proceed to *immersion in the nitrate bath contained in the dark room*. This must be done boldly, and without stopping, as each rest causes a streak across the plate. The film will appear at first *blue opal*, and will thence pass through all degrees of *opal yellow*, until it attains a rich (*creamy yellow*.) This usually occurs within two minutes at the proper temperature of the operating room, viz. at or over 60° Fahrenheit; it has then attained its maximum sensitiveness, and may, after having been repeatedly moved up and down in the bath to destroy the greasy appearance of its surface, be taken out of the bath, placed for thirty seconds with one edge in contact with blotting paper, and immediately transferred to the dark slide.

If left in the Silver Bath many seconds after the cream-yellow is produced, the sensitiveness is much diminished; as little time as possible must be allowed to intervene between this operation and the

exposure in the Camera, as, if the plate dries it loses the greater portion of its sensitiveness; under ordinary circumstances ten minutes is the greatest length of time allowable. If more than five minutes elapse, re-dip the plate in the Nitrate Bath before developing. "Archer's Bath," a wedge-shaped vessel of plate glass, effectually obviates the inconvenience above remarked, as the plate is impressioned during its stay in the Bath, and may be kept hours both before and after exposure. Of course I must not be understood to mean that the film is all this time soaking in the liquid; it is withdrawn from its influence by being placed in contact with the vertical front of the bath.

Mr. W. CROOKES has happily illustrated the principle herein involved, by enclosing the *sensitive film* between two pieces of plate glass, the cohesion between which is amply sufficient to prevent drying and loss of sensitiveness.

FOCUSSING.

The accessories of the picture having been previously arranged, place the sitter in such a position that as much as possible of the person may be in one vertical plane; all parts nearer the lens than this are magnified, those more remote diminished, and both *out of focus*, (known by their outline appearing indistinct.) The Camera being then turned towards the person, the *sliding portion* is drawn out until the image appears on the ground glass; the screw being then fixed, gives the rough adjustment; the fine is obtained by moving the milled head attached to the lens: it is usual in portraiture to focus upon the eye, or on the face

generally. The Camera should be always placed horizontally, the tripod being raised or depressed, so that the picture may always occupy the centre of the field. The right focus being obtained, put on the cap of the lens, and replace the focus glass by the slide containing the prepared plate: now draw up the shutter and proceed to the

EXPOSURE TO THE LUMINOUS IMAGE.

You effect this by directing the sitter to keep the eye fixed upon a certain spot previously arranged during the focussing, and, requiring absolute immobility, *take off the cap from the lens* during a period varying from one to two seconds, in strong light, to a minute and a half in dark weather. Experience can only determine this. Replace the *cap*, close the shutter, and take the *slide* to the dark room.

TO DEVELOPE.

Hold the plate by the corner denuded of collodion, or place it on the level stand, pour thereon the appropriate quantity of developing solution, (a picture 5 by 4 inches requires 3 drachms,) it will be found not to flow uniformly, you effect this object by pouring off again into the measure, again pouring on, and if necessary, repeating the operation. The first effect is the appearance of the high lights; these, if the picture have had the right exposure are soon followed by the half tones, and within a minute or two by the lowest tones, (shades of a black coat for example.) When these appear, a stream of water should be directed over the surface to wash off the developant, if a *positive picture*

be desired ; but if a *negative*, continue the developing, holding the plate over some white object, as long as the high lights retain their *translucency* unimpaired ; when these show a *tendency to become opaque*, stop the process with a stream of water as before. The plate may now be exposed without danger to *diffused light*, and *fixed* by pouring over it some of the Cyanide or Hypo' solution, repeating the dose until all the creamy appearance is removed. It must be then *washed* in an abundant stream of water, (care being taken to allow none to flow between the *film* and the *glass*,) then placed upon a *levelling stand*, and being covered with as much soft water as it can contain, be allowed to remain ten minutes, when it may be raised on edge to drain, and dry spontaneously. If this washing be not sufficiently attended to, when the Hypo' is used, arborescent crystallization will set in and ruin the picture. And if the Cyanide be employed, the picture will gradually fade away as it dries, which it does also if the Cyanide be left to act too long. The drying may be also effected by the aid of a spirit lamp. It is now very liable to be injured by friction ; this is prevented by *varnishing* with amber varnish poured on the plate and drained off into the bottle as in using the Collodion ; the plate may be held before a fire for ten seconds if the temperature below.

The positive picture being now *backed* with some patent jet, Brunswick black, or cotton velvet, will present a very brilliant appearance with the lights and shades in their natural positions, and be in every respect equal to a Daguerreotype, without its unpleasant glare, and *non-inverted*. The negative, without further preparation, will serve to

produce an almost unlimited number of copies, in a manner to be presently described.

The pyrogallic acid is the most appropriate agent for producing negatives, and the iron salts a positive; when the proto-sulphate is employed, some operators dip the plate in a bath thereof, its action is so rapid, that pouring it on occasionally causes stains. It will be now proper to return to the subject of Development, as we have only studied the successful result. If, on pouring on the liquid, the picture immediately starts out the high lights and half tones together, the *exposure* has been too long, and ere the lowest tones have time to develope, the whole will become fogged, and the proof be spoiled. The same effect is also produced by absence of a duly acid condition of the bath, this should therefore be attended to previously to commencing operations. An undue quantity of acid will simulate the effect to be now described. If, on the contrary, after developing some time, only the high lights are apparent, the exposure has not been sufficiently long, and it is equally a failure. Spoiled plates should not be allowed to dry, but thrown into a vessel of water, and when required for use, cleaned with a little cyanide as at first. *A dirty plate* can never produce a good picture: fortunately it can generally be detected as soon as the plate is *ready* for the nitrate bath, the dirt making its appearance in *smears* under the film. If the finished proof present large translucent spots it is a sign that the cyanide used in cleaning the glass has not been removed by *sufficient washing*.

If it be "piquée" all over, the Collodion must be examined to find if (almost infinitely) small

particles are suspended in it; should this be the case it is unfit for use until all these have been allowed to settle, this generally occurs towards the end of a bottle of Collodion; it now also becomes very thick and refuses to flow readily, obviate this by adding a little æther and allowing it to subside a little.

It is difficult, nay, almost impossible to define accurately the terms "Negative" and "Positive Picture," they being purely conventional, all pictures partaking of both characters, and some being equally both.

On holding a *Positive* over a dark surface, the details of the picture *come out* in their natural position, with respect to light and shade, those parts affected by the former, being Metallic Silver, *reflect white light*; on examining it by transmitted light, the lights appear *black*, *but very translucent*—the *shades* are represented by *perfect transparencies*.

The *Negative*, on the contrary, viewed by reflected light, presents a perfectly confused picture; the *lights* are *white patches*—the *shades* *grey ones*: by transmitted light, the *shades* are found to be nearly (not quite) transparent; from these up to the highest lights, the gradation of intensity in the black deposit uniformly increases until it becomes absolutely opaque. This is a general rule. I have seen negatives print admirably which were blood red and translucent on looking through them, and others *perfect negative* and *positive* at the same time.

I have endeavoured, in the foregoing remarks, to give as clear an idea, as I conceive possible, of the Collodion process, and indicate such shoals as

shipwreck most inexperienced hands. I am far, however, from presuming that any written instructions will equal an ocular demonstration, and such, all beginners should obtain if it be possible. As I before observed, this sketch is intended simply as a plain guide to those whose knowledge of such subjects is very limited, and who have not ready access to higher and practical authority.

PART SECOND.

POSITIVE

Photographic Process;

OR

PRINTING FROM GLASS NEGATIVES.

CHAPTER I.

APPARATUS.

Three glass or porcelain dishes, some pins bent like **S**. Two glass rods, a quire of white blotting paper, and the

PRESSURE FRAME.

A rectangular frame of wood with a rebate, serving as support to a thick glass plate, backed by the pressure board, consisting of three pieces hinged together in such a manner that the outside thirds may be individually lifted without disturbing the remainder. The pressure is obtained by two screws working through cross pieces fitted into, and sliding in grooves in the frame.

Procure some fine close-grained, even-textured, satin paper, (many excellent qualities are now in the market, Canson's Positive is as good as any,) immerse it a sheet at a time, in

SALTING { Muriate of ammonia 100 grains,
SOLUTION. { Distilled water 10 ounces,
by carefully laying down at first the edge, and

gradually extending the whole sheet into contact with the fluid surface, avoiding the enclosure of air bubbles, causing the liquid then to flow over the upper part by drawing a glass rod over it; repeat this with each sheet until a dozen are immersed. Turn the mass of paper over, pick out the bottom sheet (now uppermost,) and attach it by the bent pin by one corner to a line, and so on with the rest.

When dry, brush each sheet over with a silk handkerchief, to remove any crystals of the salt, and preserve in a portfolio labelled, SALTED PAPER. This keeps indefinitely. By replacing one third, or half the water, by the white of fresh eggs, beating up well, and after allowing twelve hours repose, straining through cambric, we obtain the liquid for Albumenizing Paper; in this however the paper must not be soaked, one side only is to be floated thereon; but there are so many difficulties attending its preparation, that the Amateur will find it more economical to purchase it. It is furnished in commerce of a very superior quality, and at a very moderate price.

A few hours before it is required for use, take each sheet of salted paper, ascertain its *right side*, *i.e.* that on which the wire marks are least apparent, and mark it in the corners with a pencil; take it into the dark room and *float* on the surface of

THE SILVER { Nitrate of silver, crystallized, 4 drachms,
SOLUTION. { Distilled water 4 ounces.

Carefully abstaining from wetting the back; when the paper loses its rigidity (usually in about three or four minutes) take it out, pass a pin through one

corner, and hang it to dry on a line, attaching a piece of blotting paper to the inferior angle. Few sheets must be prepared at once, as they will not keep many days, even though preserved in a close dark portfolio. This constitutes the **NITRATED OR POSITIVE PAPER.**

The Albumenized Paper is excited in a similar manner.

PRINTING.

Place the negative with its back on the inside surface of the glass plate of Pressure Frame, cover it with a piece of positive paper marked side downward, and interposing between it and the pressure board three or four thicknesses of flannel, press the whole into contact.

Turn the surface of glass plate now upwards in such a way that the rays of light fall perpendicularly on it, and leave it until a small portion of the paper (left purposely uncovered) assumes a dark maroon tint; then lift one portion of the pressure board and see if the high lights are sufficiently printed. You judge this by their presenting a tint many shades darker than they ought to remain in the finished picture.

Remove now to the dark room, and immerse quickly in the

TONING BATH. { Hyposulphite of soda 1 ounce,
Blackened chloride of silver 15 grains,
Saturated solution of iodide silver in hypo' 20 minims,
Soft water 6 ounces.

If you desire brown or bistre tones, but if black or purple blacks, add,

{ Chloride of gold 3 grains,
Distilled water $\frac{1}{2}$ an ounce.

cautiously poured drop by drop into the first liquid, kept stirred. The first effect is to whiten the lights rapidly; if, however, it be sufficiently *printed* in, these whiten gradually, and the dark tones increase in depth and beauty of detail; when the desired tint is reached, take out, wash in a stream of water, and soak for ten minutes in the

FIXING { Hypo' 1 ounce,
BATH. { Water 8 ounces.

The chemical theory of this process not being as yet well understood, some uncertainty exists in procuring any desired tone; as a general rule, the deeper the picture is printed by exposure to light, the longer does it require to remain in the toning bath, and consequently the nearer black are the tones. A temperature of 80° to 90° Fahrenheit greatly facilitates the operation. Albumenized Paper produces a finer detailed image, but the whites are apt, during a long toning, to become tinged with yellow.

Should (as is sometimes the case) the color still remain *brown*, and *blacks* be desired, take out the pictures, pour into a half pint of the toning bath ten drops of Acetic Acid, shake up, and immediately replace them; this seldom fails to succeed.

The Nitrate of Silver solution used in this process, should be excluded from white light, and only made in small quantities, it speedily becomes brown from use, and tinges the whites of the proofs yellow.

The only known method of restoring it is to evaporate it to dryness, fuse the salt, and dissolving it in pure water with a little Nitric Acid, again evaporate to dryness.

Nothing now remains but to wash the proof in water and allow it to soak in a large quantity, frequently changed during twelve hours ; thence removing it, press it between the leaves of a blotting book, and iron it to finish its drying and give it a gloss. It may be now mounted in any way the fancy dictates.

The *toning bath* requires the addition, from time to time, of a few drops of the hypo' iodide solution, also of the gold, if it be used. It is well always to keep this bottle full, by making up the loss after each time of using from the fixing bath, refreshing the latter with new hypo.'

PART THIRD.

Photographic Process,

OR

NEGATIVE PAPER.

PAPER PROCESS.

THIS resolves itself into two distinct heads, viz: the Calotype or Talbotype, and the Wax Paper Process; for the former it is necessary to employ English paper only, of which there are now some excellent varieties in the market; for the latter, French paper, being sized with starch is more suited, that made by Canson Freres is the best; in choosing them it must be borne in mind, that as the pictures when produced are to be used for printing from, like the pictures on glass in a former section, only such sheets can be employed as do not present any defined grain on being examined by reflected light, otherwise this grain would imprint itself upon the positive copies, and in the majority of instances, greatly deteriorate the effect.

THE CALOTYPE.

Various modifications of Mr. Fox Talbot's original method have been devised, the following appear to give the best result. The first and most important step is to produce what is known as *Iodized Paper*, i.e., paper on the surface of which is deposited a perfectly even coating of pure Iodide of Silver, this is effected either by the Single Wash

or another method, both which we shall now describe.

To Iodize Paper by the *Single Wash.*

IODIZING
SOLUTION. $\left\{ \begin{array}{l} \text{Moist Iodide of Silver 83 grains,} \\ \text{Pure Iodide of Potassium 650 grains,} \\ \text{Distilled water, 4 ounces.} \end{array} \right.$

Dissolve the Iodide of Potassium in the water, then add thereto the Iodide of Silver, and stir until complete solution is effected; should the silver not entirely disappear, add a few more grains of Iodide of Potassium, and filtering it into a clean stoppered bottle, preserve for use. The *moist Iodide of Silver* is prepared by dissolving separately each in 4 ounces of distilled water, 60 grains of Nitrate of Silver, and 60 grains of Iodide of Potassium, *pouring the former solution into the latter* constantly kept stirred, keep up the agitation until the liquid becomes bright, then allow the deposit to subside, pour off the supernatant liquid, add 4 ounces more distilled water, again agitate it and allow to subside; after repeating this operation four times, the *precipitate* is sufficiently *washed*, and when drained thoroughly is fit for use.

N.B. This operation should not be performed in a strong light.

Mark the smoothest side of your paper in two or more of the corners with a black lead pencil, float each sheet on the Iodizing liquid, until it lies quite flat, take it out and suspend to a line by bent pins.*

After treating a dozen papers in this manner, immerse them all, commencing with that first dipped, in a quantity (say $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in depth,) of *distilled or rain water if procurable*, shake them

* This part of the operation is facilitated by turning up half an inch of one edge of the paper, to prevent its coming in contact with the liquid.

frequently, and pouring off the water after an hour's immersion, add some fresh, repeat this operation for several consecutive hours, until all the soluble salts are removed, then dry. The Amateur would do well to purchase this at first, the difficulties attending the manipulation are great, and success in the subsequent processes depends in a great measure upon their being *perfectly conducted*.

Thus prepared, the *Iodized Paper* will keep in a portfolio for many months. Another method of Iodizing :—

CYANO IODIZING LIQUID.	$\left\{ \begin{array}{l} \text{Moist Iodide Silver 125 grains,} \\ \text{Pure Cyanide Potassium, about 100 grains,} \\ \text{Distilled Water 4 ounces.} \end{array} \right.$
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Add the water to the Iodide and continue adding the Cyanide dissolved in very little water, until solution is nearly effected, then filter; float the paper on this liquid and hang up as in the former instance, but instead of merely washing it, float it for one minute on

THE ACID SOLUTION.	$\left\{ \begin{array}{l} \text{Pure Hydrochloric Acid 1 part,} \\ \text{Distilled Water 40 parts.} \end{array} \right.$
-----------------------	--

Thence remove it into a vessel of clean water, and proceed to soak and wash as before. The result in both these instances is the same, but I am disposed to give a preference to the latter process, from many reasons, which however I need not here detail. I must however observe, that in the floating on the Acid, Prussic Acid is liberated, it should therefore not be conducted in a room where free circulation of air is not procurable.

To Sensitize the Iodized Paper, we require two liquids which should be kept ready prepared.

SATURATED
SOLUTION OF
GALIC ACID. $\left\{ \begin{array}{l} \text{Gallic Acid } \frac{1}{2} \text{ drachm,} \\ \text{Boiling Distilled Water 6 ounces,} \\ \text{When cool, Filter.} \end{array} \right\}$

ACETO NITRATE
OF
SILVER. $\left\{ \begin{array}{l} \text{Nitrate Silver 30 grains,} \\ \text{Glacial Acetic Acid } \text{pure} 1 \text{ drachm,} \\ \text{Distilled Water 1 ounce.} \end{array} \right\}$

When these are required for use we take

SENSITIZING
LIQUID. $\left\{ \begin{array}{l} \text{Gallic Acid Solution 10 minims,} \\ \text{Distilled Water } 1\frac{1}{2} \text{ drachms,} \\ \text{Aceto Nitrate of Silver 10 minims,} \\ \text{Distilled Water } 1\frac{1}{2} \text{ drachms.} \end{array} \right\}$ Mix.

N.B. This and the subsequent developing solution should be mixed only at the moment they are required, as they decompose by contact *even without luminous influence*; the Measures, Glasses and Rods must also be washed before being again employed.

Cause a sufficient quantity of this liquid to extend itself over a *perfectly clean* and level glass plate, apply the Iodized surface thereon for a few seconds, immediately transfer the paper on to some clean blotting paper, and pass a glass rod two or three times over *its excited surface*, then blot it off with more clean blotting paper, and transfer to the Dark Slide, where it may be retained several hours if required; the blotting paper will not serve for two operations; the liquid which has served for exciting one paper, must be thrown away and the glass cleaned previously to being employed for another operation.

Considerably larger quantities of the Silver and Gallic Solutions than those above indicated may be used. For these and many of the figures above, I am indebted to a paper by Dr. Diamond, read before the Photographic Society, November 3rd,

1853 ; the less dilute the Chemicals are employed, the more sensitive is the paper, and the less capable of keeping. The Docter states that the *medium time* of exposure in the Camera with the above proportions, is *five minutes*.

To develope the Picture, pour on a glass plate as before.

DEVELOPING
SOLUTION. { Gallic Acid Solution,
Aceto Nitrate Silver, equal quantities.

Place the impressed paper thereon, carefully abstaining from wetting the back, remove it on to blotting paper, and pass the rod several times over the wet surface ; if the picture begin instantly to appear, the exposure has been too long, but still it may be possibly saved by pouring a little distilled water over it and using the glass rod ; if the exposure has been well timed, the high lights begin to appear after a few seconds, and within five minutes the picture appears in all its due beauty, the development is stopped by washing it in a stream of water, and subsequent immersion in

HYP' FIXING { Hyposulphite of Soda 1 ounce
LIQUID. { Warm Water 8 ounces

Or

CYANIDE { Pure Cyanide Potassium 20 grains
FIXING LIQUID. { Distilled or Rain Water 10 ounces.

Until the yellow colour has entirely disappeared.

Nothing now remains but to soak it some hours in water frequently changed, to dry it perfectly between blotting paper by means of a hot iron, and wax it to give it the necessary translucency.

The waxing is best effected by strewing the surface with finely scraped white wax, and ironing the proof between two pieces of waxed paper, then remove it between two sheets of paper and

repeat the process with the iron. The proof will then be ready for printing from.

This process is an exceedingly valuable one, and has, in *skilful hands*, produced results which are truly marvellous. It enables us also to dispense with daylight in the production of positive proofs.

Paper Sensitized as above, and *dried*, may be placed under the negative in a pressure frame, and after being exposed to the light from a good lamp, or a gas-jet for a minute, and developed, gives us a *positive* of a beautiful black tone, and almost in every respect equal to that obtained on the Chloride Paper, described in a former section. The difficulties, however, inherent in it, have decided the majority of Photographers in favor of the process next to be described.

THE WAXED PAPER PROCESS.

To Wax Paper, obtain the *purest white wax*, (that ordinarily kept by Chandlers and Druggists containing Spermaceti or Stearine, is not suitable) and a steel plate, similar to that used for engraving, or even a Druggist's Pill Tile ; heat the latter by a bed of hot sand, or any suitable means, up to 212° to 250° , lay a sheet of Canson's Negative Paper thereon, and rub a cake of wax over it until it is sufficiently impregnated. Proceed thus until you have produced a sufficient stock. Each sheet is now to be placed between two other sheets of similar paper, enclosed in blotting paper, and ironed with a hot "box-heater," any excess of wax will be distributed to the clean sheets, and the centre *one* be now in a condition to receive its final ironing between blotting paper, (which for this purpose should be a fine sort) to give it uniform transparency.

The supplementary sheets seldom obtain sufficient wax, to serve without having some more added; they therefore may be heated on a future occasion, by the hot plate. The remarks appended to the Albumenized and Iodized Paper, relative to home preparation, are here equally applicable.

IODIZING	Pure Iodide of Potassium, 4 drachms Do. Bromide Do. $\frac{1}{2}$ drachm Do. Iodine 5 grains.	Mix dry and add thereto.
SOLUTION.	Sugar of Milk 4 drachms Distilled Water 10 ounces.	Dissolved separately.

Pure Cyanide of Potassium
Solutioquant: suff.

to decolorize almost entirely may then be added. Many operators replace the water by rice water, or whey of milk, but I do not think any benefit is effected. *Rice Water* is made by washing one ounce of best rice, thrice with distilled water, pouring thereon a pint of the same liquid, and just getting it to boil, straining off the liquid; after reposing twelve hours, strain the clear supernatant portion through fine cambric. *Whey*, by boiling a pint of fresh pure milk, then taking from the fire and stirring in 40 minims of pure Hydrochloric Acid, mixed with $\frac{1}{2}$ ounce of water, the coagulum being then separated by straining through muslin, leaves the whey comparatively clear; after reposing twelve hours, it may be filtered *bright* for use.

Immerse the sheets one after the other in the iodizing liquid, as directed in salting paper, and allow them to soak twelve hours, covering the dish with a glass plate; when ready to take out, turn over the mass, and having ready a dish containing soft water, pass each sheet through it by immersing

one edge and then drawing the paper through ; finally hang them up by bent pins to dry on a line. They are generally tinged a color inclining to purple, and are to be preserved for use in a portfolio.

To Sensitize. Float each paper separately on the Aceto Nitrate Solution described in a former section, (having previously marked it to know which side is sensitive.) As soon as all color has entirely disappeared, it is sufficiently impregnated and may be drawn through water as before, and either blotted off for immediate use, or dried on a line. As this paper will keep excited several days, or even three or four weeks, it is sometimes convenient to prepare a *larger number* at once ; this is done by *immersing* them in the Aceto Nitrate, leaving them a quarter of an hour draining off the liquid, pouring in an equal quantity of soft water, and after repeating this twice, finishing by drawing through clean water singly as before. The washing waters may be saved for use in a future operation.

The sensitiveness and keeping qualities of this paper vary with the number of washings, the more it is washed, the longer it keeps, and is consequently the less sensitive ; those sheets floated and used within a few hours of exciting, are nearly equal in sensitiveness to the Calotype paper before described.

The exposure in the Camera with a Lens $2\frac{1}{4}$ diameter, 12 inch focus, $\frac{5}{8}$ inch diaphragm in good diffused light, will be 5 minutes and up.

When much washed for keeping during a journey, a quarter of an hour and upwards is required. After exposure in the Camera, the latter may be kept a considerable time before being developed ; the former 12 hours. I am informed by Mr

Crookes, that he has obtained a sensitiveness nearly equal to Collodion, by replacing a sensitized waxed paper on the Aceto Nitrate, and blotting off just before exposure in the Camera.

To develope. Plunge the sheets in a saturated solution of Gallic Acid, (see page 27) within ten minutes they should begin to give some definite idea of the picture, if they do so, pour off the solution and mix it with an equal volume of the *wash waters*; page 31, or if there be none, 1-10th of its volume of Aceto Nitrate (that which has been once used for exciting is best reserved for this,) they must be lifted up from time to time, to examine by transmitted light, whether they are sufficiently developed, this they generally are, between 1 and 2 hours. The perfect result is known, by all the half tones being perfectly brought out, without solarization, (i.e. opacity) of the high lights. If over exposed, the developement will be much more rapid, and will be similar to that before explained, in the Collodion process, (page 16.) If under exposed, before the picture has sufficiently come out, the whole surface becomes fogged or veiled, by the spontaneous decomposition of the developing liquid.

Some operators affirm that the addition of a piece of Camphor to the Gallic Acid solution, tends to obviate the latter difficulty.

The development being completed, wash in a stream of water, and fix by immersion in Hypo', or better in Cyanide as (vide page 28) when well washed as there indicated, dry between blotting paper, and iron to restore the transparency lost during the repeated chemical manipulations.

The same process may be applied to *unwaxed paper*, with an equally good result, but the Iodizing

must be completed in a much shorter time, (one hour,) and the paper merely blotted off for immediate use, as in the Calotype process, from which it differs little.

Extreme cleanliness in all the vessels, and perfect freedom from turbidity in the liquids is essential ; they should all be filtered before use, except the silver solutions, which are best *poured off clear if it be possible*. Should the Aceto Nitrate require filtering, it will be best performed through a filter which has been already used for a silver salt, and kept in a *covered funnel* for the purpose ; new paper always imparts some impurity to this liquid, which injuriously affects the keeping properties of the paper prepared therewith.

It is necessary to avoid touching these papers with the fingers, except at the corners) during any part of the process, as they infallibly leave stains.

For portraiture the Collodion is necessarily super-eminent, as it is also for Landscape, when within reach of means of transit for glass plates, &c., but where it is required to make a journey on foot alone a considerable distance, it is certainly convenient to be able to carry one's light Camera, and a good supply of sensitive papers, to take the pictures, and develope them at leisure.

Stereoscopic pictures are now too well known to require a description. They are taken either by two Cameras working simultaneously, or by one only shifted sideways, so that the back describes a segment of a circle, equal to 5° between each picture.

For distance it is found that an allowance of half inch laterally, may be made for each foot intervening between the Camera and the object.

The following modifications of the Collodion process, are of great value, and obviate some difficulties which exist in its application.

The first is by Mr. Maxwell Lyte of Pau, Basses Pyrénées. After exciting the Collodion plate in the Nitrate bath, place it on the level stand, and pour over it the following solutions mixed in equal proportions, some time previously to being employed, and afterwards filtered.

Grape Sugar 8 ounces.
Distilled Water 6 ounces.
Alcohol 1 ounce. } Mix.

Nitrate Silver 200 grains.
Distilled Water 6 ounces. } Mix.

It is well to return the liquid into the measure and pour again on the plate twice. After two or three minutes it may be poured off, and the plate left some time to drain.

By this treatment the sensitiveness is greatly increased, and the plate may be used many hours after exciting ; it is developed, &c., in the ordinary manner.

Mr. G. Shadbolt has employed the same sugar, to enable the plate to be kept several days ; he makes a saccharine liquid of similar composition, which he employs as Mr. Lyte, but without the silver ; before developing, however, Mr. Shadbolt plunges the plate into a bath of distilled water *for a minute*, then redips for *an instant only* into the Nitrate bath, and afterwards proceeds in the ordinary manner.

WEIGHTS AND MEASURES MENTIONED IN THIS WORK.

60 Grains = 1 drachm } APOTHECARIES
8 drachms = 1 ounce } WEIGHT.

The 16 ounces Apothecaries weight, equal nearly 17½ ounces Avoirdupois, by which all goods are *sold retail*. N.B. This latter ounce is not *practically* divisible below the quarter.

60 minims
or drops = 1 drachm } FLUID
8 drachms = 1 ounce } MEASURE.
20 ounces = 1 pint

When drops are mentioned, minims (measured drops) are intended. The following mems. may be useful.

1 Gramme, French	=	say 15½ Grains, English
1 Kilo	„	= „ 2lb. 3oz. Avoirdupois, English
1 Litre	„	= „ 1½ Pint Fluid, „
1 Metre	„	= „ 39½ Inches „
3 Centi Metres,	=	„ 1½ Inch
6 Milli metres	=	„ ¼ Inch

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